



[113.1004]

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Re: Application of: Michael HAUSMANN, et al.
Serial No.: 09/462,435
Filed: January 7, 2000 as national phase of International Patent
Application Serial No. PCT/DE98/01908, filed July 9, 1998
For: WAVE FIELD MICROSCOPE WITH DETECTION
POINT SPREAD FUNCTION
Art Unit: 1634
Examiner: Bradley L. SISSON
Confirmation No.: 5089
Atty Docket No.: 113.1004
Customer No.: 23280

Mail Stop: APPEAL
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

December 11, 2006

APPELLANTS' BRIEF UNDER 37 C.F.R. § 41.37

Sir:

Appellants submit this brief for the consideration of the Board of Patent Appeals and Interferences (the "Board") in support of their appeal of the Final Rejection dated November 15, 2005 in this application. The statutory fee of \$250.00 is paid herewith. Also enclosed herewith is a petition to revive an unintentionally abandoned application with the statutory fee of \$750.00.

1. REAL PARTY IN INTEREST

The real party in interest is Ruprecht-Karls-Universität Heidelberg of Seminarstrasse 2, 69117 Heidelberg, Germany, a German University, the assignee of the entire right, title and interest in the above-identified patent application. The invention was assigned by inventors Michael Hausmann, Christoph Cremer, Joachim Bradl and Bernard Schneider to Ruprecht-Karls-Universität Heidelberg. The assignment was recorded on June 19, 2000 at reel 010925, frame 0488.

2. RELATED APPEALS AND INTERFERENCES

Appellants, their legal representatives, and assignee are not aware of any appeal, interference or judicial proceeding that directly affects, will be directly affected by, or will have a bearing on the Board's decision in this appeal.

3. STATUS OF CLAIMS

Claims 28 to 40 are pending. Claims 28 to 40 have been finally rejected as per the Final Office Action dated November 15, 2005. The rejection to claims 28 to 40 thus is appealed. A copy of appealed claims 28 to 40 is attached hereto as Appendix A.

4. STATUS OF AMENDMENTS AFTER FINAL

Claims 1 to 27 were canceled. No amendments after final office action were made. In a telephonic interview on April 4, 2006 with examiner Bradley L. Sisson, Dr. Christopher Cremer and William C. Gehris participating for applicants, claim 28 was discussed. Applicant filed a Notice of Appeal with a petition for extension on April 14, 2006.

5. SUMMARY OF CLAIMED SUBJECT MATTER

Independent claim 28 recites a wave field microscope (see, e.g. page 15, line 34, and page 17, line 19) comprising an illumination system for illuminating an object for examination (see, e.g. page

16, lines 4 to 19, page 17, lines 23 to page 18, line 3) with a plurality of coherent light beams (see, e.g. page 16, lines 6 to 7 and page 17, lines 25 to 26) through at least one objective lens arrangement (see, e.g. page 16, lines 10 and page 17, line 27), the object having a plurality of object structures, the light beams interfering in at least one object plane (see, e.g. page 19, lines 11 to 15 and page 47, lines 10 to 16) and illuminating the object in the object plane with an interference pattern (see, e.g., page 19, lines 15 to line 20, page 24, line 22 to page 25, line 13); an optical detection system (see, e.g. page 16, line 20 to page 17, line 3, and page 18, lines 4 to 18); and a holding device for the object (see, e.g. page 19, lines 1 to 9). The interference pattern is a two- or three dimensional point pattern generated by two or three standing wave fields (see, e.g. page 18, line 32 to 33 and page 48, lines 16 to 18), the object being shiftable relative to the point pattern (see, e.g. page 19, lines 5 to 9, page 24, lines 22 to 30), each object structure causing a modulation of the light detected by the optical detection system within a detection point spread function (see, e.g., Example 2, page 29 to page 32, line 22), the modulation being given by the point spread function of the wave field microscope through convolution of the point pattern and the detection point spread function (see, e.g., Example 2, page 29 to page 32, line 22). For each object structure, a maximum of the point spread function of the wave field microscope is detectable within the detection point spread function using intensity measurements (see, e.g., Example 2, page 29 to page 32, line 22), a space between two object structures being detectable as a function of values of the maximums of the point spread function of the wave field microscope for the two object structures so as to permit the wave field microscope to measure geometric distances between the object structures (see, e.g., Example 2, page 29 to page 32, line 22, particularly page 33, lines 9 to 22).

6. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

- I. Claims 28 to 40 are rejected under 35 U.S.C. §112, first paragraph for failing to comply with the written description requirement.
- II. Claims 28 to 40 are rejected under 35 U.S.C. §112, first paragraph for failing to comply with the enablement requirement.

III. Claims 28 to 40 are rejected under 35 U.S.C. §112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

IV. Claim 28 is rejected under 35 U.S.C. §101 because the claimed recitation of a use, without setting forth any steps involved in the process, results in an improper definition of a process, i.e. results in a claim which is not a proper process claim under 35 U.S.C. §101.

7. ARGUMENT

I: 35 U.S.C. §112, first paragraph, written description requirement:

Claims 28 to 40 are rejected under 35 U.S.C. §112, first paragraph for failing to comply with the written description requirement.

Claim 28 recites a wave field microscope comprising:

an illumination system for illuminating an object for examination with a plurality of coherent light beams through at least one objective lens arrangement, the object having a plurality of object structures, the light beams interfering in at least one object plane and illuminating the object in the object plane with an interference pattern;

an optical detection system; and

a holding device for the object,

the interference pattern being a two- or three dimensional point pattern generated by two or three standing wave fields,

the object being shiftable relative to the point pattern, each object structure causing a modulation of the light detected by the optical detection system within a detection point spread function, the modulation being given by the point spread function of the wave field microscope through convolution of the point pattern and the detection point spread function,

for each object structure, a maximum of the point spread function of the wave field microscope being detectable within the detection point spread function using intensity measurements,

a space between two object structures being detectable as a function of values of the maximums of the point spread function of the wave field microscope for the two object structures so as to permit the wave field microscope to measure geometric distances between the object structures.

The Final Office Action states the proper standard for review of the written description requirement: that the inventor reasonably conveyed that the inventor had possession of the claimed invention at the time the application was filed.

But then the Final Office Action fails to address this standard: The Final Office Action states "A review of the disclosure fails to find an adequate written description of how any embodiment of the claimed wave field microscope is to be manufactured." See page 5, paragraph starting with 8. This is an enablement issue, and not a written description issue.

With respect to the arguments at page 4 of the Final Office Action that the inventor "failed to possess the full genus of wave field microscopes encompassed by the claims" and that the wave field microscope claimed comprises "an illumination system that comprises an infinite number of objective lenses, an infinite number of coherent light beams, and an infinite number of objective lenses arrangements..." or "any level of resolution" (See Paras. 5, 6 and 7), these arguments are not understood and are not the standard for the written description requirement. If so, every apparatus claim using the word "comprising" would be invalid. If one claims "a camera having at least one octagonal lens" and the specification describes a camera with a single octagonal lens, that claim is not invalid for the fact that the inventor did not describe an infinite number of octagonal lenses or the level of resolution.

The specification must clearly show that the inventor had possession of the invention.

Here, the inventor clearly had possession of the invention as claimed as evidenced by the specification cites for claim 28 in the summary of claimed subject matter above.

In addition, a clear reading of the specification shows that both Type I and Type II microscopes described by the specification at page 15, line 34 to page 19, line 19 evidence the inventor possessed a device with the features of claim 28. Example II and other examples as

well is a good example of the possession of the invention.

Withdrawal of the rejections based on the written description requirement to claims 28 to 40 is respectfully requested.

II: 35 U.S.C. §112, first paragraph, enablement requirement:

Claims 28 to 40 are rejected under 35 U.S.C. §112, first paragraph for failing to comply with the enablement requirement.

The entire argument in the Final Office Action on enablement appears based on the assertion that “one cannot enable what that which they do not possess.” See page 6 at para 10. But possession is the standard for a written description rejection.

The present applicant is thus caught in a vicious circle: the Final Office Action says it does not possess the present invention because there is no adequate description of how it is to be manufactured or enabled, and it is not enabled because he did not possess it.

In any event, it is clear that the present application teaches one of skill in the art how to make and use the present invention. It is incredibly detailed on how the measurements are to occur, and describes for example on page 15 to 18 and Examples 1 and 5 how one would make and use such a wave field microscope as described in claim 28. Granted, wave field microscopes are not the simplest of devices, but those of skill in the art reading the specification clearly would have understand how such a wave field microscope would have been constructed. The Office Action does not seem to dispute this, but argues possession instead.

Withdrawal of the enablement rejections to claims 28 to 40 is respectfully requested.

III: 35 U.S.C. §112, second paragraph, indefinite:

Claims 28 to 40 are rejected under 35 U.S.C. §112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The Office Action asserts there is no structural connection between the illumination system, optical system and holding device. However, there is no need for claiming a structural connection between them, and many claims interrelate items without precise structure. This is especially so in microscopes, where the only necessary interrelation may be light.

The claimed parts are clearly interrelated properly:

an illumination system for illuminating an object for examination with a plurality of coherent light beams through at least one objective lens arrangement, the object having a plurality of object structures, the light beams interfering in at least one object plane and illuminating the object in the object plane with an interference pattern;

an optical detection system; and

a holding device for the object,

the object being shiftable relative to the point pattern, each object structure causing a modulation of the light detected by the optical detection system.

Thus, the illumination system illuminates the object held by the holding device and the optical detection system detects a modulation of that light.

The assertion on the claiming of “intensity measurements” also is not understood. The language is clear and definite.

Withdrawal of the second paragraph rejections to claims 28 to 40 is respectfully requested.

IV: 35 U.S.C. §101

Claim 28 is rejected under 35 U.S.C. §101 because the claimed recitation of a use, without setting forth any steps involved in the process, results in an improper definition of a process, i.e. results in a claim which is not a proper process claim under 35 U.S.C. §101.

There is no use claimed. An apparatus is claimed.

Withdrawal of the rejection to claim 28 under 35 U.S.C. 101 is respectfully requested.

Respectfully submitted,

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APPENDIX A:

PENDING CLAIMS 28 to 40 OF
U.S. APPLICATION SERIAL NO. 09/462,435

Claim 28 (previously presented): A wave field microscope comprising:

an illumination system for illuminating an object for examination with a plurality of coherent light beams through at least one objective lens arrangement, the object having a plurality of object structures, the light beams interfering in at least one object plane and illuminating the object in the object plane with an interference pattern;

an optical detection system; and

a holding device for the object,

the interference pattern being a two- or three dimensional point pattern generated by two or three standing wave fields,

the object being shiftable relative to the point pattern, each object structure causing a modulation of the light detected by the optical detection system within a detection point spread function, the modulation being given by the point spread function of the wave field microscope through convolution of the point pattern and the detection point spread function,

for each object structure, a maximum of the point spread function of the wave field microscope being detectable within the detection point spread function using intensity measurements,

a space between two object structures being detectable as a function of values of the maximums of the point spread function of the wave field microscope for the two object structures so as to permit the wave field microscope to measure geometric distances between the object structures.

Claim 29 (previously presented): The wave field microscope as recited in claim 28 wherein the optical detection system detects fluorescent light.

Claim 30 (previously presented): The wave field microscope as recited in claim 28 wherein the interfering light beams are adjustable to be aligned antiparallel or at a variable angle to one another.

Claim 31 (previously presented): The wave field microscope as recited in claim 28 wherein the lens arrangement has at least two spatial directions, the lens arrangement having in at least one of the spatial directions a first objective lens with a first numerical aperture or a first reflector assigned to a second objective lens with a second numerical aperture higher than the first numerical aperture, and, in at least one of the other spatial directions, the lens arrangement has two other objective lenses with other numerical apertures lower than the second numerical aperture, or a third objective lens with a third numerical aperture lower than the second numerical aperture and a second reflector assigned to the third objective lens.

Claim 32 (previously presented): The wave field microscope as recited in claim 28 wherein the illumination system includes at least one first illumination source for the light beams capable of coherence and at least one beam splitter for decoupling at least one of the light beams, the lens arrangement including a common lens assigned to both the first illumination source and the at least one beam splitter, the light beams and beam splitter capable of being coupled to said common lens so that on a rear focal plane facing away from an object space, the light beams produce two spaced apart focal points, and that in a further space between the rear focal plane and a further focal plane in the object space the light beams run in a variably-adjustable angle to one another and interfere to create a standing wave field.

Claim 33 (previously presented): The wave field microscope as recited in claim 32 wherein the illumination system further comprises at least one additional coherent light beam, and the lens arrangement includes a further objective lens being assigned to additional coherent light

beam, the further objective lens capable of directing and aligning the additional coherent light beam in the object space so that the additional coherent light beam interferes with the standing wave field produced by the light beams so as to generate the point pattern.

Claim 34 (previously presented): The wave field microscope as recited in claim 28 wherein the detection system comprises at least one detection objective lens similar to an objective lens of the objective lens arrangement.

Claim 35 (previously presented): The wave field microscope as recited in claim 28 wherein the holding device is arranged in the wave fields and is capable of being rotationally mounted about an axis.

Claim 36 (previously presented): The wave field microscope as recited in claim 35 wherein the holding device is capable of being rotated 360 degrees about the axis.

Claim 37 (previously presented): The wave field microscope as recited in claim 28 point pattern is capable of being rotated about an axis.

Claim 38 (previously presented): The wave field microscope as recited in claim 28 wherein the holding device or and/or the point-pattern are capable of being rotated about an axis so as to illuminate the object sequentially or simultaneously with the point pattern.

Claim 39 (previously presented): The wave field microscope as recited in claim 28 wherein the detection system includes a scanner reflector arranged so as to be suitable for forming an image of the object structures using the intensity measurements.

Claim 40 (previously presented): The wave field microscope as recited in claim 28 wherein the illumination system includes in at least one first spatial direction a real illumination source for the two- or multi-photon excitation, and in at least one other spatial direction, another illumination source for the two- or multi-photon excitation, and the standing wave fields (WF_1, WF_2, \dots, WF_i) generated having wavelengths ($\lambda_1, \lambda_2 \dots, \lambda_i$) differing from one another, and having distances (d_1, d_2, \dots, d_i) between specific wave maxima or wave minima of $d_1 = \lambda_1 / 2n \cos\theta_1$ or $d_2 = \lambda_2 / 2n \cos\theta_2$ or $d_i = \lambda_i / 2n \cos\theta_i$ where n equals the index of refraction in an object space and $\theta_1, \theta_2, \dots, \theta_i$ equals an intersection angle of the light waves of the wavelengths $\lambda_1, \lambda_2 \dots, \lambda_i$ with an optical axis, and with the wave fields $WF_1, WF_2 \dots W_i$ being aligned with respect to one another so that at least a maximum of at least two standing wave fields is situated at a same place.

APPENDIX B

EVIDENCE APPENDIX UNDER 37 C.F.R. §41.37 (c) (ix):

No evidence pursuant to 37 C.F.R. §§1.130, 1.131 or 1.132 and relied upon in the appeal has been submitted by appellants or entered by the examiner.

APPENDIX C

RELATED PROCEEDINGS APPENDIX UNDER 37 C.F.R. §41.37 (c) (x):

As stated in “2. RELATED APPEALS AND INTERFERENCES” of this appeal brief, appellants, their legal representatives, and assignee are not aware of any appeal or interference that directly affects, will be directly affected by, or will have a bearing on the Board's decision in this appeal.